Nuclear Medicine Protocols

NM Bone Marrow Imaging

PURPOSE

To determine distribution of abnormal bone marrow.

SUPPORTIVE DATA

Written, verbal, or electronic order from ordering provider

INDICATIONS

- Anemia
- Some lymphomas and multiple myelomas
- Stem cell damage from chemotherapy or radiation therapy
- Assess marrow distribution at suspected osteomyelitis sites

SAFETY

All studies performed in compliance with radiation safety manual.

EQUIPMENT

- Dual headed camera
- Low energy-high resolution collimators
- 10-15 mCi 99mTc Sulfur Colloid

PATIENT PREP

None

PROCEDURE

The patient will be brought back to NM department and identified using 2 patient identifiers

Explain procedure to patient.

Inject patient with 10-15 mCi 99mTc-SC. Injection is administered by venipuncture or IV. If IV must be started, lidocaine may be used.

Radiopharmaceutical dosing information is entered into Radiopharmaceutical tracking software.

Wait 30 minutes post injection before scanning.

Have patient void before scan and remove any metal.

Place patient supine on scanning bed. Either acquire anterior and posterior whole-body image that includes head and stops at knees or take static images of the area of interest.

Review images with radiologist in case additional images are requested. Radiologist may revise imaging parameters.

If White Blood Cell study is to be included, do In-111 WBC imaging first. After In-111 scan is complete, inject Tc-sulfur colloid, wait 30 min, and then scan.

Charges will be billed, and exam will be completed in RIS.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under “notes” in PACS. This information will then be formally read by radiologist on shift for the day.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in RIS
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Bone Scans

PURPOSE

For detection of suspected bone abnormalities

SUPPORTIVE DATA

Obtain a written, verbal, or electronic order from provider. Scan to be performed as soon as possible from time of request. Any recent outside images (previous bone scans, CT scans, MRI, X-rays, etc.) to be placed into PACS.

INDICATIONS

Include but not limited to:

- Detection of bone metastases from cancer (Whole body bone scan)
- Evaluation for osteomyelitis (Three phase bone scan)
- Evaluation of musculoskeletal trauma (Limited or Whole-body bone scan)
- Determination of unknown bone pain (Limited, Spect, or Whole-body bone scan)
- Evaluation of primary benign and malignant bone lesions (Whole body bone scan)
- Determination of stress fractures (Limited or whole body)
- Suspect occult Fracture (Whole body scan)
- Evaluation for reflex sympathetic dystrophy (Three phase bone scan)

EQUIPMENT LIST

- Gamma Camera, large field of view. Single or Dual head.
- Collimator: Low energy, high resolution
- Energy window: 15% window centered at 140 KEV.
- Hot marker, can either be Co-57 point source or 99mTc-point source

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

No barium studies 48 hrs prior to exam

Drink a minimum of 16 oz of water between injection and delayed scan.

Void before delayed scanning.

Have patient drink extra fluids for 24 hours after scan.

PROCEDURE

General Information

Check provider's orders for request for any specifics imaging areas.

Radiopharmaceutical given intravenously:

25mCi 99mTc-MDP for adults.

For pediatric dose, calculate the dose using the formula 275 uCi/kg. The minimum of 1mCi to be delivered and maximum pediatric dose should not exceed 25 mCi 99mTc-MDP. Radiologist can modify pediatric dose.

Inject patient by either straight stick or starting an IV. If an IV is started, Lidocaine can be used.

Injection time: 15minutes for radiopharmaceutical administration.

Patient returns between 2 and 6 hours after injection of radiopharmaceutical.

Patient needs to empty bladder before positioning on scan table.

Have pt. remove any metal or thick objects such as wallets, necklaces, change, pocketknives, belts, etc., that may be obstructing the area of interest.

Position patient to achieve best images. This may mean supine, prone, or upright. Place camera head(s) as close to the area of interest as possible.

Standard imaging for oncology patient include: Whole Body and static images of LLAT/RLAT Skull. Take additional views as needed. This imaging set can be revised by Radiologist.

Standard imaging for non-oncology patient include: Whole Body and static images of region of interest. Take additional views as needed. This imaging set can be revised by Radiologist.

If the whole-body image shows extensive metastatic bone disease then the LLAT and RLAT Skull is the only static image needed.

Charges will be billed, and exam will be completed in RIS.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Three phase bone scan-flow portion

Start an IV in the opposite arm from area of interest if possible. Lidocaine can be used.

Check orientation before injecting. Feet should point downwards; hands should point upwards.

Start camera before isotope gets to area of interest. Take into account any delay time for camera to respond, the size of the view, how quickly you are injecting, and distance between injection site and area of interest.

Whole Body Bone

Scan from the top of patient's head to bottom of patient's feet. The imaging parameters can be revised by Radiologist. Take additional views as needed.

Position camera as close as possible to patient.

SPECT

Place camera heads over place of interest.

Position camera as close as possible to patient.

Take additional views as needed.

The imaging parameters can be revised by Radiologist.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in RIS.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Brain Perfusion

PURPOSE

To aid in the diagnosis of blood flow to the brain.

SUPPORTIVE DATA

Obtain a written, verbal, or electronic order from provider. Perform scan as soon as possible from time of request.

INDICATIONS

Include but not limited to:

- Determination of Alzheimer's Disease vs other causes of dementia
- Determination of Brain death

EQUIPMENT LIST

- Gamma Camera: large field of view, single or dual head.
- Collimator: Low energy, High resolution, parallel hole
- Energy window: 20% window centered at 140 KEV

Radiopharmaceuticals:

Brain Death

- 99mTc-DTPA 15-20mCi given intravenously
- 99mTc-HMPAO 10-30mCi given intravenously
- 99mTc-ECD 10-30mCi given intravenously

Brain SPECT

- 99mTc- HMPAO 15-30mCi given intravenously
- 99mTc-ECD 15-30mCi given intravenously

SAFETY

In compliance with Radiation Safety Procedure manual.

Patients with neurologic deficits may require special care and monitoring.

If sedation needed for an outpatient, he/she should bring medication with them. Sedation can be given after the injection of radiopharmaceutical.

PATIENT PREPARATION

Avoid caffeine, alcohol, or other drugs known to affect cerebral blood flow

PROCEDURE

General information

Review provider's orders.

Radiopharmaceutical given intravenously.

When starting an IV, the technologist may use Lidocaine.

Charges will be billed, and exam will be completed in RIS.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Brain SPECT

Start IV and give the patient ear plugs. Let patient rest in a dark and quiet room for 10-15 minutes before administering the radiopharmaceutical.

Quietly and without interaction, inject patient with radiopharmaceutical. Keep the patient in the dark and quiet room for at least another 40 minutes post-injection.

After 40 minutes the lights may be turned on and IV removed.

Position patient in head holder while SPECT images are being performed.

The imaging set can be revised by the Radiologist.

Brain Death

Leave patient on transport gurney or bed.

Prepare to use only one camera head in the anterior position.

Center camera so that anterior view is straight on and includes carotids, and top of skull.

Follow flow with 300 second static images at immediate, 5 min, 10 min and 20 min.

Check with Radiologist for additional acquisitions.

The imaging set can be revised by the Radiologist.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in RIS.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Cardiac Amyloidosis

PURPOSE

To detect cardiac amyloidosis

SUPPORTIVE DATA

Written, verbal, or electronic order from provider. Scan performed as soon as possible upon request.

INDICATIONS

Include but not limited to:

- Heart failure and increased left ventricular wall thickening without explanation
- Positive diagnosis of cardiac transthyretin amyloidosis (ATTR) on echocardiogram and/or cardiac MRI
- Suspected cardiac amyloidosis in patients where cardiac MRI is contraindicated
- Family history of cardiac amyloidosis
- Unexplained heart failure with retained ejection fraction
- Individual with heart failure indications and/or symptom. In addition, has been diagnosed with carpal tunnel syndrome bilaterally, neuropathy, or atrial arrhythmias without common risk factors.

EQUIPMENT LIST

- Gamma Camera: Large field of view, dual head
- Collimator: Low energy, high resolution
- Energy window: 140 keV with a 20% window

Radiopharmaceuticals:

- 15 mCi Tc99m-Pyrophosphate

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

None

Procedure

Intravenously inject 15mCi 99m Tc-Pyp.

Planar imaging should be taken at 1hr and 3hrs post injection.

Position patient supine under the camera with the top of the FOV to include the SSN. Anterior, Lateral, and LAO images should be obtained for 750k counts

SPECT imaging to follow planar images at the 1hr and 3hr time periods.

Camera configuration should be 180-degree orientation for and angular range of 360 degrees

Patient may leave after 3hr images are acquired

Process the images and measure total and absolute mean counts of the background and myocardium ROIs obtained from anterior planar images

Charges will be billed, and exam will be completed in EPIC

Images will be placed on Xcelera or PACS per physician preference.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- "Nuclear Medicine General Worksheet" with documented history and physical, as well as radioactive dose documentation
- Scan all documents into PACS
- Bill patient in Epic.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Cardiac Stress Test

PURPOSE

To detect coronary artery disease.

SUPPORTIVE DATA

Written, electronic or verbal order from provider. Procedure will be performed as soon as possible from time of request.

INDICATIONS

Include but not limited to:

- Differentiate between coronary and non-coronary causes in patients with chest pain or other angina equivalents
- Known or suspected coronary artery disease (CAD)
- Congestive heart failure and/or left ventricular systolic dysfunction
- Documentation of myocardial perfusion abnormalities before and after therapy with risk stratification based on severity and extent of myocardium abnormalities.
- Assess for cardiac sarcoidosis

EQUIPMENT LIST

- Gamma Camera: large field of view., dual head
- Collimator: low energy, high resolution, or smart zoom
- Energy window: 15% window centered at 140 KEV
- Treadmill with variable speeds and inclinations and recording ECG capabilities
- EKG Patches
- EKG gating device

Radiopharmaceuticals:

- 99mTc-sestamibi or 99mTc-Tetrafosmin
- 201-TI
- Regadenoson (LEXISCAN)
- Aminophylline

Non-Radioactive Pharmacologic Doses

- Lexiscan (Regadenoson) : Unit dose as per package insert. Given by IV over 10-15 seconds.
- Aminophylline: as per package insert and provider request. Dose determined by provider and given by IV.

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

Stressing method as per provider instruction.

On-site provider decides what non-radioactive drugs to give patient.

PATIENT PREPARATION

Acquire patient BMI

NPO 4 hrs prior to injection

Stress patients: no caffeine 12 hrs prior to injection

Treadmill stress patients, hold medications as specified by provider.

Severe claustrophobic patients should bring medication with them to relieve anxiety.

IV started by CVL, NM or IV Therapy, preferably in left arm. Lidociane may be used.

Signed consent forms

Skin prepped and electrodes placed by CVL or Nuclear staff

PROCEDURE

General information

Acquire patient's BMI to select correct dosing protocol

Radiopharmaceutical given intravenously:

One Day Stress Dosing

99mTc-tetrafosmin (MYOVIEW) or 99mTc-sestamibi (CARDIOLITE)

BMI under 32= 8mCi Rest/ 24 mCi Stress

BMI between 32 and under 40= 10 mCi Rest/ 30 mCi Stress

BMI of 40 and over= 15 mCi Rest/ 45 mCi Stress

Up to 4mCi Tl-201 may be substituted for 99mTc as per Radiologist or Cardiologist.

Two Day Stress Dosing

20 mCi of 99mTc-tetrafosmin (MYOVIEW) or 99mTc-sestamibi (CARDIOLITE)

Up to 4mCi Tl-201 may be substituted for 99mTc as per Radiologist or Cardiologist.

Radiologist or Cardiologist may revise dose amounts.

Pharmacological stress at discretion of provider.

Prone images may be performed immediately after stress images.

Examination time for one day studies are approximately 4-6 hrs.

Weekend inpatient exams will be performed as two-day stress studies. All exams may be done as two-day protocols at provider's discretion.

Rest Acquisition

Check provider's order for special requests

Start an I.V. line. Lidocaine may be used.

Inject radiopharmaceutical through I.V. line.

Attach ECG leads.

Acquire a supine SPECT study. Imaging parameters can be revised by Radiologist or Cardiologist. Take additional views as needed

When completed, patient can immediately proceed to stress portion.

Stress Acquisition

CVL or Nuclear staff will prepare the patient for the stress portion of the exam as per provider's request.

Stress portion:

Treadmill stress: Upon the supervising provider's notification, inject radiopharmaceutical through I.V.

Pharmacologic stress:

Lexiscan: Upon supervising provider's notification, inject Lexiscan as per package inset, flush with saline, inject radiopharmaceutical and repeat flush with saline.

Upon supervising provider's notification, technologist or provider may administer aminophylline if required.

Attach ECG leads.

Stress imaging may begin immediately if patient had a Treadmill test. A delay of 45 minutes is required prior to stress imaging if a pharmacological test was performed.

Acquire a supine SPECT imaging. If patient is able to lay prone, acquire prone SPECT imaging.

Imaging parameters can be revised by Radiologist or Cardiologist.

Take additional views as needed.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

DOCUMENTATION

- Written, verbal, or electronic order from provider
- NM “Cardiac” worksheet
- MD notes and/or History & Physical
- Medication and/or lab results
- Affix radiopharmaceutical stickers to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC. Send original CVL ECG tracings & MD order to Medical records

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Cardiac Viability

PURPOSE

To detect coronary artery disease, viability, and other perfusion abnormalities.

SUPPORTIVE DATA

Written, verbal, or electronic order from provider. Scan performed as soon as possible upon request.

INDICATIONS

Include but not limited to:

- Differentiate between coronary and non-coronary causes in patients with chest pain or other angina equivalents
- Known or suspected coronary artery disease (CAD)
- Congestive heart failure and/or left ventricular systolic dysfunction
- Documentation of myocardial perfusion abnormalities before and after therapy with risk stratification based on severity and extent of myocardium abnormalities.
- Assessment of myocardial viability.

EQUIPMENT LIST

- Gamma Camera: Large field of view, dual head
- Collimator: Low energy, high resolution or smart zoom
- Energy window: 15% window at 167 KeV; and 40%window at 71KeV
- EKG Patches
- EKG gating device

Radiopharmaceuticals:

- 3mCi Tl-201
- 1mCi tl-201 as bump-up dose

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

NPO 4-6 hrs prior to injection

Severely claustrophobic patients should bring medication with them to relieve anxiety.

General information

This is a non-stress study for determination of viability

Radio pharmaceutical:

Viability study: 3 mCi Tl-201; plus, a 1 mCi Tl-201 bump-up dose to be given after 4-hour post injection scan is completed

No prone imaging when using Thallium.

Try to gate at least one of the three acquisitions.

Examination time: 5 hrs first day. Patient then returns at 24 hours for 1 hr of imaging.

Procedure

Explain the test to the patient.

Start an IV on the patient, Lidocaine may be used. Leave IV in to inject bump up dose after 4-hour scan.

Inject the patient with 3 mCi Tl-201 and wait 10-15 mins before scanning.

Position patient supine on scanning table. Have patient bring both arms over head if possible.

Center over heart and acquire a SPECT image.

Tell patient to have nothing by mouth and to return for second set of SPECT images in 4 hours.

After completion of acquisition and checking images, re-inject patient with 1 mCi Tl-201 booster shot. Remove IV and instruct patient to return tomorrow for 24-hour SPECT images.

The patient will return 24-hour post injection for final SPECT imaging.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

DOCUMENTATION

Written, verbal, or electronic order from provider.

NM Viablity worksheet

Inpatient History & Physical- if available

Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.

Scan all documents into PACS

Bill patient in EPIC.

Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Cisternogram

PURPOSE

Evaluate cerebral spinal fluid flow.

Support Data

A written, verbal, or electronic order obtained from a provider. Scan performed as soon as possible from time of request. Any recent outside images to be placed in PACs.

INDICATIONS

Include but not limited to:

- Investigation of suspected communicating hydrocephalus (normal pressure hydrocephalus)
- Evaluation of Cerebral spinal leaks (CSF)
- Verification of CSF shunt patency

Equipment List

- Dose: 1mCi In-111 DTPA
- Gamma camera, single- or dual-head
- Medium energy collimator(s)
- Energy window centered at 178kev and 247 kev, with 20% window
- Head holder

Safety

Perform procedure in compliance with Radiation Safety Procedure Manual.

Patient Preparation

No prep for days that patient will be scanned.

Follow X-ray patient prep for Lumbar Puncture on injection day.

Procedure

General information

Scheduling: NM can begin the exam on a Mon. or Tues. of a full 5-day week (no holidays). Exam can take up to 5 days of scanning. Imaging schedule can be revised by Radiologist.

On patients having Rhinorrhea leak scan, referring provider must place nasal pledgetts in am of day the procedure starts. This should be done before patient comes for registration and admission to SOU.

Scheduling will take care of setting up time (preferably early am) for lumbar puncture, patients report time to SOU, and scan times for NM including injection time during lumbar puncture.

SOU will get all necessary provider info, reserve bed space, and do any pre-injection or labs as needed.

Patient is returned to SOU for observation and should remain flat for 2 hours.

Charges will be billed, and exam will be completed in EPIC..

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Cisternogram Injection

X-ray and SOU will follow protocol for performing a Lumbar Puncture.

Nulcear Medicine will prepare the radiopharmaceutical and deliver the radiopharmaceutical for injection.

A Provider will perform the injection of the Radiopharmaceutical.

Nuclear Medicine will survey and dispose of anything radioactive following guidelines within the Radiation Safety Manual.

Cisternogram Imaging

Acquisition

Change to medium energy, parallel hole collimator(s)

At four hours post-injection, begin first day's scans. Acquire 10 min views of ANT SKULL, POST SKULL, LT LAT SKULL, and RT LAT SKULL. Acquire 5 min POST LUMBAR (including injection site), and POST THORAX.

Repeat ANT SKULL, POST SKULL, RT LAT and LT LAT SKULL IMAGES at 24 hr, and 48 hr. Check with MD to determine if 72 hr and 96 hour images are needed.

Images and imaging schedule can be revised by Radiologist.

Rhinorrhea- nasal leak

Acquisition

Change to medium energy parallel hole collimators.

Scan at 6 hrs post lumbar injection. Image posterior thorax and posterior lumber for 5 mins. Scan for 5 mins in anterior, posterior, right lateral, and left lateral of the head with pledgetts in. Repeat after pledgetts are out.

Place pledgetts on an absorbent pad on top of camera face (use only one camera head, or single head camera). Acquire an image for 5 min. Then do a ROI of equal size of each area, and record values.

Check images with a Radiologist for any additional imaging.

Images can be revised by a Radiologist.

Documentation

- Written, verbal, or electronic provider's order.
- Fill out NM "General"worksheet.
- Inpatient History & Physical- if available
- Affix radiopharmaceutical sticker with correct dosage listed to worksheet.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical records

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM GI Bleed

PURPOSE

To determine the presence and location of a gastrointestinal bleed.

SUPPORTIVE DATA

Written, verbal, or electronic order from provider. Scan performed as soon as possible from time of request.

Study is a STAT procedure.

INDICATIONS

Include but not limited to:

- Active gastrointestinal bleeding.

EQUIPMENT LIST

- Gamma Camera with large field of view
- Collimator: low energy high resolution
- Energy Window: 20% window centered at 140 KEV

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREP

No barium studies 48 hrs prior to procedure is preferred

PROCEDURE

Radiopharmaceutical: 20-25 mCi Tc99m Red Blood Cell (Ultratag kit)

Explain the procedure to the patient.

Start IV on patient. Lidocaine may be used. Draw 1-3 mL of blood and label red blood cells as per instructions in the ultratag kit. Leave IV in until end of test.

Position the patient supine under the camera with abdomen in field of view.

Inject the labeled red cells via the IV, flush with 5-10 mL of normal saline and commence immediate imaging.

Do dynamic imaging for one hour and then have images checked with Radiologist. It may be necessary to have the patient return for additional imaging to aide in defining the presence or site of bleeding.

Radiologist may revise imaging protocol.

Patient may leave when imaging is complete.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under “notes” in PACS. This information will then be formally read by radiologist on shift for the day.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Gallium

PURPOSE

To determine areas of infection or inflammation.

Support Data

Written, verbal, or electronic order from provider.

INDICATIONS

Include but not limited to:

- Localization of infection, abscess or osteomyelitis
- Fever of unknown origin
- Inflammation
- Bone or bone marrow related osteomyelitis
- Sarcoidosis

Equipment

- Gamma camera: large field of view, single or dual head
- Collimator: Medium energy, general purpose
- Energy windows: 20% window centered at 93 KEV;12% window centered at 185 KEV and 296 KEV
- ***Radiopharmaceutical***: 6-8 mCi 67Ga Citrate (dependent on ROI)

Safety

Perform procedure in compliance with Radiation Safety Procedure Manual.

Patient Preparation

Bowel prep night before 24 hr and 48 hr imaging.

No barium studies 48 hr prior to injection

Procedure

<u>General Information</u>

Explain the procedure to patient and make sure they are aware of the potential multiple scanning times and bowel prep.

If starting an IV, lidocaine may be used.

Have patient lay supine on scan bed and remove all metal items.

Process images.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under “notes” in PACS. This information will then be formally read by radiologist on shift for the day.

Abscess Imaging

Radiopharmaceutical: 6mCi Ga-67.

Scan at 4-6 hr & 24 hr post injection.

Scan whole body (Head to mid thighs) or planar images of ROI. Check with Radiologist for additional spot views, or SPECT images. Imaging is dependent on which area of the body is the area of interest. Whole body scanning and/or SPECT of the area of interest can be imaged. Radiologist may revise imaging parameters.

Tumor Imaging

Radiopharmaceutical: 8 mCi Ga-67

Scan at 48 & 72 hr

Scan whole body (Head to mid thighs) or planar images of ROI. Check with Radiologist for additional spot views, or SPECT images. Imaging is dependent on which area of the body is the area of interest. Whole body scanning and/or SPECT of the area of interest can be imaged. Radiologist may revise imaging parameters.

Documentation

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Gastric Empty

PURPOSE

To evaluate disorders of the gastric system.

SUPPORTIVE DATA

Written, verbal, or electronic order from provider. Scan performed as soon as possible from time of request. Refer to Gastric Retention comparison chart.

INDICATIONS

Include but not limited to:

- Gastroparesis
- Early satiety
- Abnormal gastric motility

EQUIPMENT LIST

- Gamma Camera: large field of view: Single or dual head camera
- Collimator: Low energy, high resolution
- Energy Window: 20% window centered at 140 KEV.
- 4 oz. egg white
- 2 slices of bread
- 2 packets of jam
- 120ml of water
- Instant oatmeal if pt. allergic to eggs
- ***Radiopharmaceutical***: 500uCi 99mTc-sulfur colloid in 0.4 mL (Order 750uCi)

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

Contraindications

- Patient allergic to meal
- Patient must be able to fast for 4 hours. Fasting in diabetic patient may result in hypoglycemia.

MEDICATIONS TO BE OFF 48 hrs prior to exam:

Prokinetics:

- Metoclopramide (Reglan) 48hrs, unless specifically requested to do study with patient on Reglan.
- Tegaserod (Zelnorm)
- Erythromycin
- Domperidone (Motilium)

Opiate analgesics: (if patient is on opiates all the time, consult with radiologist first)

Make sure to record how long the patient has been on these medications.

- Demerol
- Codeine
- Morphine
- Oxycontin
- Percodan
- Percocet
- Other unlisted opiates

Anitcholinergic antispasmodics:

- Bentyl
- Donnatal
- Levsin
- Robinul

PATIENT PREPARATION

NPO from midnight or minimum of four hours.

Exam can take 1-4 hours.

Patient's allergies and condition will determine if eggs, or oatmeal is consumed.

Stop prokinetic agents 2 days prior to exam unless requested by referring MD for patient to stay on them.

Medications that delay gastric emptying should be stopped 2 days prior to exam

Explain procedure to patient. They need to eat meal within 10 min. they will stand or sit for the images; an anterior and posterior image for one minute is taken immediately, 30min, 1 hr, 2hr, 3hr, and 4hr post eating. If necessary, they may lie down. If images obtained in a position other than upright, note this on worksheet. Images are taken for 4 hours or until 10% or less of the meal remains in the stomach. Images may be revised by the Radiologist.

Patients are to stay upright whenever possible, and after first hour they may leave department, move around, but they may not ingest any more food or liquids. They may lie down if necessary, if so, document on worksheet

Document on worksheet if there have been any abdominal surgeries.

PROCEDURE

<u>General information</u>

Radiopharmaceutical: 500 uCi 99mTc-sulfur colloid

Patient to eat egg meal or oatmeal and drink milk or water within 5-10 min of starting meal.

Diabetic patients should bring their monitors and insulin.

Document on worksheet any related diseases (hernia, GERD, esophageal motility disorder's,etc), previous treatments, surgeries.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

PROCEDURE ONE: ***Egg Whites and Toast***

Technologist prep time: prior to exam start, obtain 4 oz. of raw egg white, two slices of white bread and 2 jam packets.

Egg whites are from a carton of egg whites that are stored in the medication refrigerator. When the carton is opened it is dated and initialed. The carton expires 30 days after being opened.

Inject the radiophameceutical into 4 oz. of raw egg white. Cook the egg until cooked. Egg whites are served with 2 pieces of toast, 2 jam packets and approximately 120 mL water.

If the eggs must be stored after being made, they are dated, timed and placed in the medication refrigerator in the Hot Lab. The eggs must be used within 4 hours of preparation.

Document all meal changes on work sheet.

When patient arrives, explain entire procedure and remind patient about the length of time to exam will take.

Have patient put on gloves and bib. Have the patient eat the meal within 10 minutes.

After completion of meal, dispose of all items into a plastic bag and store in radioactive storage in the hot lab area

PROCEDURE TWO: Oatmeal

Use on patients that are allergic to or cannot tolerate eggs. Note change on worksheet.

Use one package of instant oatmeal, any flavor.

Place contents of package into microwave bowl.

Add small amount of boiling or very hot water to moisten oatmeal to paste consistency.

Add 500uCi 99mTc-sulfur colloid to oatmeal and mix.

Add more hot water to desired consistency.

Patient may substitute 6-8oz water for milk. Document changes on worksheet.

After completion of meal, dispose of all items into a plastic bag, and store in radioactive storage area in hot lab.

Imaging

Imaging protocol can be changed by supervising provider.

Obtain anterior and posterior images immediately post meal, 30 minutes, 1 hour, 2 hour, 3 hour and 4 hours post meal.

The study is completed early if the patient's emptying is below 10%

Processing

A single screenshot should be made showing all images sequentially.

Counts for each time period are documented.

Counts are calculated as a percentage of the current counts vs the highest counts with decay taken into account.

DOCUMENTATION

- Written request from provider.
- Fill out the Gastric Emptying Work sheet
- Medication list
- Affix radiopharmaceutical sticker with given dose listed on worksheet
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original provider order to Medical Records

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Hida

PURPOSE

To evaluate acute and chronic biliary disease.

Support Data

Obtain a written, verbal, or electronic order from provider. Scan to be performed as soon as possible from time of request. Any recent outside images (previous bone scans, CT scans, MRI, X-rays, etc.) to be placed into PACS.

INDICATIONS

Include but not limited to:

- Evaluation of suspected acute cholecystitis
- Evaluation of chronic biliary tract disorders
- Evaluation of common bile duct obstruction
- Detection of bile extravasation
- Functional assesment of hepatobiliary system

Equipment List

- Gamma Camera: large field of view, single or dual head
- Collimator: Low energy, High resolution
- Energy window: 20% window centered at 140 KEV.
- ***Radiopharmaceutical:***
    - Adults: 5.0 mCi Disofenin or Mebrofenin by IV administration.
    - Infants/children: 0.05-0.07 mCi/kg with a minimum of 0.5 mCi for Disofenin or 1.0 mCi for Mebrofenin

Safety

Perform the procedure in compliance with Radiation Safety Procedure Manual.

Contraindications

Hypersensitivity to a hepatobiliary compound

Patient Preparation

NPO for at least 4hr minimum.

Off narcotics 4-6 hrs, or 4 half-lives of the medication. Radiologist may revise.

If patient has been NPO for 24 hrs or more, then patient must be pre-dosed with Kinevac (CCK).

Have patient drink extra fluids for 24 hours after scan.

Procedure

Pre-treat with Kinevac (CCK)

Intended for patients that have been NPO for 24 hours or more.

CCK is weight based and determined by the following formula: Patients weight in kg multiplied by 0.02 mcg equals the CCK dose.

Make up the CCK vial according to package insert and radiologist instructions.

Administer CCK over an 18-20 minute time frame. This is about 1 mL per minute. After CCK is given, wait a minimum of 30 minutes before starting the hida exam.

Standard Hida procedure with Kinevac (CCK)

Position the patient supine for imaging with the camera centered over the abdominal area including liver at the upper edge of the field of view.

Place an IV in the patient's arm, Lidocaine may be used. Inject the radioisotope and acquire dynamic imaging immediately.

The immediate vascular flow images (30sec/frame for 8 frames) are for 4 minutes.

Filling flow images continue at 60sec/frame for 60 min to demonstrate the visualization of the hepatobiliary system.

If after this sequence there is activity in the common bile duct, but NOT in the gallbladder, check with Radiologist. The Radiologist may choose to give morphine or additional imaging. If morphine is warranted proceed with Morphine protocol.

If after this sequence there is visualization of a gallbladder, administer Kinevac (CCK) to obtain a gallbladder ejection fraction.

Make up the Kinevac vial as per package insert and radiologist instruction. CCK is weight based and determined by the following formula: Patients weight in Kilograms multiplied by 0.02 mcg CCK.

Acquire Kinevac sequential images using best position for separation of gallbladder from bowel (ANT or LAO of any degree) for 60sec per frame for 24 frames. Infuse the kinevac starting at 1 min, over 18-20 minutes within this time frame. This is about 1ml per minute.

Record any symptoms that the patient has during the CCK infusion and at what time post start of infusion. Ask the patient to rate the symptom from 1-10. Level 1 would be very slight to level 10 being severe.

The Radiologist may revise imaging parameters based on patient's needs.

After the acquisition of the kinevac images, the patient may leave.

Process the images and calculate the gallbladder ejection fraction.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Hida procedure with Ensure

Position the patient supine for imaging with the camera centered over the abdominal area including liver at the upper edge of the field of view.

Place an IV in the patient's arm, Lidocaine may be used. Inject the radioisotope and acquire dynamic imaging immediately.

The immediate vascular flow images (30sec/frame for 8 frames) are for 4 minutes.

Filling flow images continue at 60sec/frame for 60 min to demonstrate the visualization of the hepatobiliary system.

If after this sequence there is activity in the common bile duct, but NOT in the gallbladder, check with Radiologist. The Radiologist may choose to give morphine or additional imaging. If morphine is warranted proceed with Morphine protocol.

If after this sequence there is visualization of a gallbladder, proceed with Ensure to obtain a gallbladder ejection fraction.

Have patient drink an 8 ounce Ensure then image for 1 hour at 60 sec/frame.

The Radiologist may revise imaging parameters based on patient's needs.

After the acquisition of the Ensure images the patient may leave.

Process the images and calculate the gallbladder ejection fraction.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Morphine Protocol

If patient has a driver proceed with Morphine protocol. However, if patient does not have a driver or is unable to get transportation, do not give morphine. Proceed with delayed imaging times per Radiologist.

Obtain a written or electronic order from the radiologist. The dose calculation is 0.04 mg per patient's weight (kg) or a standardized dose of 2 mg. Radiologist will determine which method is appropriate.

Obtain morphine from the pharmacy or SOU. A Nurse, provider, or technologist under MD supervision may give morphine. Administer the morphine injection over 2-3 minutes.

After morphine injection, image for 1 hour (60 sec/frame) or per radiologist recommendation.

After the acquisition of the morphine images the patient may leave with a driver.

Process the images.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Bile leak procedure

Patient can be on narcotics if gallbladder was removed.

Position the patient supine for imaging with the camera centered over the abdominal area including liver at the upper edge of the field of view.

Place an IV in the patient's arm, Lidocaine may be used. Inject the radioisotope and acquire dynamic imaging immediately.

The immediate vascular flow images (30sec/frame for 8 frames) are for 4 minutes.

Filling flow images continue at 60sec/frame for 60 min to demonstrate the visualization of the hepatobiliary system.

After the hour of imaging show the radiologist to see if additional images are needed.

If no images are needed, the patient may leave.

Process the images.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Documentation

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Document the dose of Kinevac on worksheet.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original provider order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Liver Spleen

PURPOSE

To evaluate the liver and/or spleen for abnormalities.

SUPPORTIVE DATA

Written, verbal, or electronic order from provider. Scan performed as soon as possible from time of request.

INDICATION

Include but not limited to:

- Differentiate cavernous hemangiomas from other hepatic tumors
- Assessing the size, shape, and position of liver and/or spleen
- Detecting and monitoring masses of liver and/or spleen
- Identifying functioning splenic tissue

EQUIPMENT LIST

- Gamma camera: large field of view, dual head
- Collimator: Low energy, high resolution
- Energy window: 20% window centered at 140 KEV

Radiopharmeceuticals:

- 20-25 mCi 99mTc-labeled red cells for hemangioma imaging
- 6-10 mCi 99m Tc-Sulfur Colloid for liver/spleen imaging
- 1-6 mCi 99m Tc-labeled damage blood cells for spleen imaging (Planar)
- 15-20 mCi 99m Tc-labeled damage blood cells for spleen imaging (SPECT)

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

No barium studies within 24 hrs

PROCEDURE

<u>Hemangioma</u>

Start IV on patient. Lidocaine may be used. Draw 1-3 mL of blood and label red blood cells as per instructions in the ultratag kit.

Remove any metal from the area to be scanned

Position the patient on the imaging table with the camera centered over the abdominal area including the liver and spleen in the field of view. If possible, have patient bring arms up over head.

Inject labeled RBC through IV and scan immediately. Acquiring flow in anterior and posterior position.

Patient returns 3 hours later for SPECT scan and planar images

Image parameters can be revised by radiologist.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Liver/Spleen

Inject patient with 6-10 mCi 99Tc-Sulfur Colloid. If starting an IV, Lidocaine may be used.

Wait 15 minutes before scanning.

Remove any metal from the area to be scanned

Position the patient on the imaging table with the camera centered over the abdominal area including the liver and spleen in the field of view. If possible, have patient bring arms up over head.

Acquire the following images: Anterior/Posterior, RAO/LPO, LAO/RPO, and RT LAT/LT LAT statics. Follow these images with SPECT imaging.

Image parameters can be revised by radiologist.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Damaged Red Blood Cells

Start heating water bath, heating to 49-50 degrees Celsius or about 122 degrees Fahrenheit.

Start IV on patient. Lidocaine may be used. Draw 1-3 mL of blood and label red blood cells as per instructions in the ultra tag kit.

Place ultra tag vial in water bath for 20 minutes.

Allow to cool and re-inject patient with tagged RBC.

Wait 30-120 min before imaging per radiologist.

Proceed with planar or SPECT images as ordered.

Image parameters can be revised by radiologist.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Lung VQ

PURPOSE

To determine a diagnosis of pulmonary emboli, evaluate lung ventilation and perfusion and estimate of post operative function.

SUPPORTIVE DATA

Written, verbal, or electronic request from provider

Chest x-ray within 24 hours

Ventilation done in conjunction with perfusion scan for determination of pulmonary embolis

INDICATION

Include but not limited to:

- Evaluate for pulmonary embolism
- Evaluation lung transplants
- Quantify differential pulmonary function before pulmonary surgery for lung cancer
- Evaluate congenital heart or lung disease such as cardiac shunts, pulmonary arterial stenoses, and arteriovenous fistulae and their treatment.
- Evaluate the cause of pulmonary hypertension.

EQUIPMENT LIST

- Gamma camera: single or dual head
- Collimator's: Low energy, high resolution
- Energy window: 15% window centered at 140 KeV
- Nebulizer system

Radiopharmaceuticals:

- 25-30 mCi 99mTc-DTPA
- 5 mCi 99mTc-MAA

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

Patient must have a chest X-ray within 24 hours

PROCEDURE

General Information

Whenever possible, have patient in sitting position for inhalation and supine for perfusion injection.

Use disposable sterile nebulizers for ventilation.

Acquisition

Ventilation

Ventilation study is done before perfusion study.

Position patient in a sitting position if possible.

Place disposable nebulizer set into lead canister.

Add 25-30 mCi DTPA to nebulizer by sterile technique through rubber port.

Explain procedure to patient and importance of keeping a tight seal around mouthpiece.

Apply a nose clip to Patient's nose. Then place mouthpiece in patients' mouth and turn on oxygen to 10 liters/min. If patient cannot maintain seal around mouthpiece, consider using a ventilation mask.

Have patient breathe through the nebulizer for 3-5 min.

After allotted time, remove nose clip, turn off oxygen, then remove mouthpiece. Place all nebulizer items into yellow plastic bag provided, seal and put into lead storage for decay.

Obtain the following views: ANT, POST, LPO, RPO, LAO, RAO, RT LAT, and LT LAT. Images may be revised by radiologist.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Perfusion

Perfusion exam done after ventilation or on its own for quantification.

Position patient supine on scanning table if possible. This is the preferred position.

Explain procedure to patient.

Inject patient with Tc-99m MAA either by venipuncture or start an IV line. If starting an IV, Lidocaine may be used.

Obtain the following views: ANT, POST, LPO, RPO, LAO, RAO, RT LAT, and LT LAT. Images may be revised by radiologist.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under “notes” in PACS. This information will then be formally read by radiologist on shift for the day.

Quantification

Position patient supine on scanning table if possible. This is the preferred position.

Explain procedure to patient.

Inject patient with Tc-99m MAA either by venipuncture or start an IV line. If starting an IV, Lidocaine may be used.

Obtain the following views: ANT and POST. Images may be revised by radiologist.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under “notes” in PACS. This information will then be formally read by radiologist on shift for the day.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM MUGA

PURPOSE

To determine the ejection fraction and the wall motion of the left or right ventricle.

SUPPORTIVE DATA

Written, verbal, or electronic order from provider. Scan performed as soon as possible upon request.

INDICATIONS

Include but not limited to:

- Evaluate effects of chemotherapy drugs on cardiac function, before, during and after chemotherapy
- Determine systolic and diastolic function indices
- Determine regional and global wall motion
- Assess cardiac chamber size and morphology

EQUIPMENT LIST

- Gamma Camera: large field of view
- Zoom function
- Collimator: low energy, high resolution
- Energy window: 20% window centered at 140 KEV
- 20-25mCi 99mTc-O4 Tagged red blood cell kit

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

None

PROCEDURE

Explain procedure to the patient.

Start IV on patient. Lidocaine may be used. Draw 1-3 mL of blood and label red blood cells as per instructions in the ultra tag kit. Leave IV in until end of test.

When the labeled red cells are ready, re-inject into patient.

Attach three leads on the patient's chest and turn on the ECG gating machine.

Position the camera for an appropriate LAO view, obtaining the optimum separation between the right and left ventricle. Then proceed with an ANT and LLAT view.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under “notes” in PACS. This information will then be formally read by radiologist on shift for the day.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Meckel's Diverticulum

PURPOSE

To determine the presence and location of an ectopic gastric mucosa bleeding site.

SUPPORTIVE DATA

Written, verbal, or electronic order from ordering provider.

INDICATIONS

- Unexplained gastrointestinal bleeding
- Identify site of ectopic gastric mucosa

EQUIPMENT

- Gamma Camera: Large field of view, single or dual head
- Collimator: low energy, high resolution
- Energy window: 20% window centered at 140 KEV

Radiopharmeceutical, injected intravenously:

- 10-15 mCi 99mTc-O4 in adult
- 0.05 mCi/kg 99mTc-O4 in children, minimum of 0.25 mCi

Oral Cimetidine:

- ***Adult***: take 300mg QID x 2 days before appointment
- ***Children***: take 20mg/kg/day x 2 days before appointment
- ***Neonates***: 10-20 mg/kg/day

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

No barium studies 48 hours prior

MD may request pre-treatment with oral Cimetidine 2 days prior to appointment. NOTE: if other drug requested, please refer to SNMMI procedure guidelines for dosage and time frame.

PROCEDURE

If it is a Cimetidine study, patient should take oral Cimetidine for two days prior to exam.

Explain the procedure to the patient, parent, or guardian.

Place the patient supine on the imaging table with camera head covering from stomach to bladder.

Start an IV on patient, lidocaine may be used.

Inject radiopharmaceutical and start imaging at 1 minute/frame for 1 hour.

On completion of study, review images with Radiologist to determine if additional images are needed. Radiologist may revise imaging parameters

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under “notes” in PACS. This information will then be formally read by radiologist on shift for the day.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Octreotide

PURPOSE

To determine receptor sites for neuroendocrine tumors vs normal bowel uptake.

SUPPORTIVE DATA

Written, verbal, or electronic order from referring provider.

INDICATIONS

Include but not limited to:

- Neuroendocrine tumors
- Carcinoids

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

Patient to take over-the counter mild laxative (Fleets or Mag citrate) the evening before injection.

16-24 oz. water in the morning before injection. Void as needed.

Repeat laxative the evening after injection and each evening with scanning the next day.

EQUIPMENT

- LFOV gamma camera, single or dual head. with medium energy collimator(s)
- Select energy windows at 20%; center on 172 & 245 peak
- Octreoscan dose: 6 mCi of In-111 pentetreotide.

PROCEDURE

Start an IV on patient, Lidocaine may be used.

Inject patient and have the patient return in 4 hours.

Have patient void prior to any scan.

Start whole body imaging (head to mid thighs) 4 hours post injection and statics if Radiologist requests.

Patient returns 24 hrs later for Whole Body scan (head to mid thighs) and SPECT of lower abdomen from liver to bladder unless radiologist requests otherwise.

Patient returns 72 hours later for Whole Body scan (head to mid thighs) and SPECT of lower abdomen from liver to bladder unless radiologist requests otherwise.

Imaging parameters and scan days may be revised by radiologist.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under “notes” in PACS. This information will then be formally read by radiologist on shift for the day.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Parathyroid

PURPOSE

To demonstrate parathyroid adenomas using dual-phase imaging technique.

SUPPORTIVE DATA

Written, verbal, or electronic order from provider. Scan performed as soon as possible from time of request.

INDICATIONS

Include but not limited to:

- Hypercalcemia
- Suspect parathyroid adenomas

EQUIPMENT LIST

- Gamma Camera: Large field of view, single head and dual-head
- Collimator: low energy, high resolution, pinhole
- Energy window: 20% window centered at 140 KEV.

Radiopharmaceutical*:*

- 20-25mCi 99mTc-sestamibi if scan is needed
- 5mCi 99mtc-sestamibi if for injection only for same day surgery (May be revised by radiologist)

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

None

PROCEDURE

<u>Parathyroid with scan</u>

Explain procedure to patient.

Inject patient with radiopharmaceutical either by venipuncture or IV. If starting an IV, lidocaine may be used.

Wait 10-15 minutes before imaging

Position patient supine on imaging table with neck moderately hyper-extended. Anatomical area of interest should be in field of view.

Acquire an anterior image either using pinhole or magnified view. This image is followed by a SPECT image.

The patient will leave and return 2 hours later post-injection. Acquire an anterior image with and without a marker of the substernal notch. These images can be acquired with a pinhole or magnified view.

Images can be revised by radiologist.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under “notes” in PACS. This information will then be formally read by radiologist on shift for the day.

Parathyroid injection only (Surgery)

Explain procedure to patient.

Inject 5 mCi Tc-mibi 2hrs prior to surgery unless other instructions are given by radiologist.

Inject the radiopharmaceutical either by venipuncture or IV. If starting an IV, Lidocaine may be use.

Charges will be billed, and exam will be completed in EPIC.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Renal

PURPOSE

For evaluation of renal blood flow, relative size and function of kidneys.

SUPPORTIVE DATA

Obtain a written, verbal, or electronic order from provider. Scan performed as soon as possible upon request.

INDICATIONS

Include but not limited to:

- Acute and chronic renal failure
- Renal transplant rejection, obstruction, and anastomosis
- Renal vascular hypertension
- Ureteral obstruction

EQUIPMENT LIST

- Gamma Camera: large field of view. Single or dual head
- Collimator: Low energy, high resolution.
- Energy window: 15% window centered at 140 KEV.
- Blood pressure cuff
- Stethoscope
- ***Radiopharmaceutical:*** 5 mCi 99mTc-MAG-3

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

General Information

Oral hydration: 16-24 oz of water two hours prior to exam. If patient is a dialysis patient, restrict fluid intake to 8 oz of water.

No food restrictions

Medications: See individual procedures for medications to take or hold.

PROCEDURE

General Flow and Function

No medication restrictions.

Start an IV on the patient, Lidocaine may be used. Leave IV in until end of study.

Have patient remove any interfering clothing (belts, back brace, etc.).

Have patient void before starting scan.

Position patient supine on the table with camera underneath the patient.

Inject radiopharmaceutical and acquire flow, pre-void, and post void. Radiologist may revise imaging parameters.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Captopril

Patient must be off ACE inhibitors 3-7 days depending on type. Check with radiologist.

Patient must be off Lasix 24 hrs

Start an IV on the patient, Lidocaine may be used. Leave IV in until end of study.

Take the patients baseline blood pressure. Next give the patient 50 mg. of Captopril by mouth and have the patient drink eight ounces of water.

Have the patient wait in the waiting room. Take the patient's blood pressure every 15minutes for one hour.

Have patient remove any interfering clothing (belts, back brace, etc)

Have patient void before starting scan.

Position patient supine on the table with the camera underneath the patient.

Inject radiopharmaceutical and acquire flow, pre-void, and post-void. Radiologist may revise imaging parameters.

Advise patient that a General Flow and Function study may be needed within the next 2-3 days based on the results from the Captopril study. Radiologist will make this determination.

Charges will be billed and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Lasix

Patient must be off lasix 24 hr prior to test

Start an IV on the patient, Lidocaine may be used. Leave IV in until end of study.

Have patient remove any interfering clothing (belts, back brace, etc.).

Have patient void before starting scan.

Position patient supine on the table with camera underneath the patient.

Inject radiopharmaceutical and acquire flow, pre-void, and post void. Radiologist may revise imaging parameters.

Administer 40 mg Lasix over 60 seconds by IV starting 10-15 minutes post radiopharmaceutical injection

Note the frame/time lasix was given to patient.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under “notes” in PACS. This information will then be formally read by radiologist on shift for the day.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Sentinel Node

PURPOSE

To determine lymphatic flow from site of tumor to assist surgeon in selecting the sentinel node.

SUPPORTIVE DATA

Written, verbal, or electronic order from provider.

INDICATIONS

Include but not limited to:

- Metastatic involvement of lymph system from breast cancer or melanoma site

EQUIPMENT LIST

- Gamma Camera: large field of view
- Collimator: low energy, high resolution
- Energy window: 15% window centered at 140 KEV
- Co-57 sheet source, and Co-57 point source or Tc-99m point source
- ***Radiopharmaceutical:*** 500uci -1mCi of 99mTc-filtered sulfur colloid

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

For melanoma studies, use a numbing cream on melanoma and 1 inch beyond edge is preferred but not required. Use according to package insert and Radiologist recommendation.

PROCEDURE

<u>Breast Sentinel Node</u>

Add 0.25 cc of buffered lidocaine to 500 uCi of 99m-TC-filtered sulfur colloid.

Injection will be given 1-6 hrs before surgery. The time frames can be revised by the surgeon or the radiologist.

Injection may take place in patient's room or in Nuclear Medicine.

Injection will be given on the lateral side of the outer edge of the areola, on the affected breast. Injection site can be revised by surgeon or radiologist.

Injection will be done by a Nuclear Medicine Technologist or Radiologist.

Bring dose and all injecting supplies to injection area.

Explain procedure to patient.

After injection bring all supplies back to Nuclear Medicine for decay.

If images are requested by the ordering provider, start taking images of the area of interest. Images may be revised by radiologist.

Continue imaging until the node is in view or upon radiologist determination that the procedure is complete.

If a node is visualized, mark two locations on the patient's skin with a permanent marker to identify location.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Melanoma Sentinel Node Injection

Radiopharmaceutical: 1 mCi 99mTc-filtered Sulfer Colloid. Volume and dose amounts may be revised by radiologist.

Injection may be given 1-6 hrs before surgery. The time frames can be revised by the surgeon or the radiologist.

Injection may take place in patient's room or in Nuclear Medicine.

Explain procedure to patient.

Clean off numbing cream if used.

The injection will take place near melanoma site and can be revised by radiologist.

The injection will be done by a Nuclear Medicine Technologist or Radiologist.

Bring dose and all injecting supplies to injection area.

Explain procedure to patient.

If images are requested by the ordering provider, start taking images of the area of interest. Images may be revised by radiologist.

Continue imaging until the node is in view or upon radiologist determination that the procedure is complete.

If a node is visualized, mark two locations on the patient's skin with a permanent marker to identify location.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Thyroid Ablation

Purpose

For the treatment of benign and malignant disorders of the thyroid gland.

Support Data

Written, verbal, or electronic order from ordering provider.

INDICATIONS

Include but not limited to:

- Hyperthyroidism: treatment of Graves' disease, toxic multinodular goiter, or toxic autonomously functioning thyroid nodule(s).
- Nontoxic Multinodular Goiter: used for diminishing the size of.
- Postoperative ablation/treatment of thyroid remnants after partial or complete thyroidectomy.
- Treatment for thyroid cancer.

Equipment List

- ***Radiopharmaceutical***: I-131 capsule(s) in dose amount as per Radiologist.
- Water
- If imaging is requested by the radiologist or ordering provider, see Thyroid Whole Body Scan procedure.
- Gamma Camera: large field of view
- Collimator: high energy, parallel hole
- Energy window: 20% window centered at 364 Kev.

Safety

Perform procedure in compliance with Radiation Safety Procedure Manual.

Patient Preparation

NPO 2 hrs prior to I-131 dose ingestion, and also NPO 2 hours post I-131 dose ingestion.

Patient cannot be pregnant or nursing. If the patient is female, and currently breast feeding, they will need to discontinue breast feeding according to Radiologist recommendation.

A negative pregnancy test is required for female patients no more than 5 days prior to the patient receiving the dose unless there is documentation of hysterectomy, tubal ligation, or over 65 years of age.

Medication and diet preparation will be determined by the radiologist.

The radiologist may determine that thyrogen injections are needed before therapy. The injections would be done consecutively for two days before the therapy. The thyrogen injections are performed by the SOU.

Procedure

General Information

Patient will be verified by at least two identifiers.

Radiologist to review patient history, labs, and other accompanying paperwork to determine/verify the proposed treatment.

Radiopharmaceutical: I-131 sodium iodine capsule(s), given orally. Dose as determined by the radiologist.

Examination time: 30 - 60 minutes for consultation and administration of oral dose. Imaging dependent on, if imaging required/requested by radiologist.

The Radiologist or technologist is to explain the indications, alternatives, benefits, and potential complications to the patient.

The Radiologist or technologist will obtain written informed consent from the patient.

All I-131 Oral administrations must be given by a physician licensed to administer radiopharmeceuticals or under his/her supervision.

I-131 capsules will be given with a glass of water.

Provide instructions for the patient receiving I-131 therapy treatment.

Charges will be billed, and exam will be completed in EPIC.

If images are taken, image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under “notes” in PACS. This information will then be formally read by radiologist on shift for the day.

Release of Therapy Patients to Home

As per WAC 246-239-055 and current Skagit Valley Hospital Radioactive Materials License WN-M0196-1, patients may be released from the hospital after administration of I-131 therapy doses between 33mCi - 220mCi.

Patient criteria for release:

- Written instructions will be provided to patients.
- Radiologist will review and discuss the procedure before dosing the patient.
- Formal reasons and calculations can be found within the radioactive materials license.

Documentation

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- History & Physical
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Signed dose order form from licensed Radiologist
- Recent labs: T3, T4, TSH etc.
- Consent form
- Pregnancy questionnaire

- Patient instruction
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Thyroid Uptake and Scan

Purpose

To provide a non-invasive method of evaluating the thyroid gland.

Support Data

Written, verbal, or electronic order from provider.

Recent ordering physician office chart notes

Recent thyroid function lab results

INDICATIONS

Include but not limited to:

- Evaluation of the size and location of thyroid tissue.
- Evaluation of hyperthyroidism.
- Evaluation of suspected focal or diffuse thyroid disease.
- Evaluation of clinical laboratory test suggestive of abnormal thyroid disease.
- Assessment of the function of thyroid nodules.
- Differentiating hyperthyroidism from other forms of thyrotoxicosis.
- Calculating iodine 131 administered activity for patients to be treated for hyperthyroidism or ablation therapy.

Equipment List

- Gamma Camera, large field of view.
- Collimator: Low energy, high resolution, parallel hole and pinhole
- Thyroid Uptake Probe
- Energy Window: 20% window centered at 159 KEV.

Radiopharmeceuticals:

- I-123 capsule(s) 200uCi-300uCi for Uptake and Scan (preferred)
- I-131 capsule 30uCi for Uptake and Scan
- 6 mCi 99m Tc-O4 for thyroid imaging

Safety

Perform procedure in compliance with Radiation Safety Procedure Manual.

Patient Prep

Thyroid Uptake and Scan

- Off thyroid medications 3-6 weeks as per Radiologist
- No iodinated IV-contrast within 6 weeks
- Off iodine supplements as per Radiologist
- No food 2 hrs prior to dosing (may have water)
- No food for 2 hrs post dosing (may have water)
- Adrenocorticosteroids for 1 week
- Bromides for 1 week
- Butazolidine for 1 week
- Mercurials for 1 week
- Methimazole (Tapazole) for 1 week
- Nitrates for 1 week
- Perchlorate for 1 week
- Propylthiouracil for 1 week
- Salicylates (large dosage) for 1 week
- Sulfonamdies for 1 week
- Thiocyanate for 1 week
- Tri-iodothyronine (Cytomel) for 2-3 weeks
- Thyroid extract (Synthroid, Proloid) for 4 weeks
- Iodine solution (Lugol's or SSKI) for 6 weeks
- Iodine containing antiseptic for 3 weeks
- Shellfish, Seaweed and Kelp for 2-3 weeks
- Amiodarone for 3-6 months
- Oil-based iodinated contrast for 3-6 months

If using I-131 capsule, female patients will need a pregnancy test if under 55 and no history of a hysterectomy or tubal ligation.

Patient prep can be revised by Radiologist

Thyroid Tc-99m Scan Only

No prep

Procedure

Thyroid Uptake and Scan

Patient dosing:

- Measure and record Thyroid capsule(s) and lab background before getting patient.
- Give water and the radiopharmaceutical 200-300 uCI I-123 capsule(s) or 30uCi of I-131 only if I-123 is unavailable to patient. I-123 or I-131 is taken orally.

- Instruct patient to wait 2 hours before eating.
- Patient returns 6 hours after ingestion of radiopharmaceutical for thyroid images and function test.

Acquisition

Use thyroid uptake probe to perform 6-hour uptake function test. Place thyroid probe at patient's neck. Center over thyroid gland and take a one-minute measurement. Then place thyroid probe at patient's thigh, away from bladder. Take another one-minute measurement.

Bring patient into camera room for scanning.

Position patient supine with head tilted back (place pillow under shoulders). With pinhole collimator acquire 5 min statics in the Anterior, RAO and LAO positions. If pinhole is unavailable, take images with a magnified view.

Next acquire a parallel collimator view with a Co-57 marker. On the image mark the suprasternal notch, cricoid cartilage, chin and a 5 cm reference line.

Radiologist can revise image protocol.

Patient returns for a 24-hour uptake function test.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Thyroid Tc Scan

Inject patient with 6 mCi 99m Tc. If starting an IV, Lidocaine may be used.

Wait 10 minutes before scanning.

Position patient supine with head tilted back (place pillow under shoulders). With pinhole collimator acquire 10 min statics in the Anterior, RAO and LAO positions. If pinhole is unavailable, take images with a magnified view.

Next acquire a parallel collimator view with a CO57 marker. On the image mark the suprasternal notch, cricoid cartilage, chin and a 5 cm reference line.

Radiologist can revise image protocol.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

Documentation

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS

- Bill patient in EPIC.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Thyroid Whole Body Imaging

Purpose

Evaluation of functioning thyroid cancer, either recurrent in the thyroid bed or metastasized.

Support Data

Obtain a written, verbal, or electronic order from provider. Scan to be performed as soon as possible from time of request. Any recent outside images (previous thyroid scans, CT scans, MRI, X-rays, etc.) to be placed into PACS.

INDICATIONS

Include but not limited to:

- Evaluation of functioning thyroid cancer, either recurrent in the thyroid bed or metastasized.

Equipment List

- Gamma Camera: large field of view
- Collimator: Low Energy, High Resolution for I-123 or High energy, general purpose for I-131
- Energy window: 20% centered at 159 KEV for I-123 or 364 KeV for I-131

Radiopharmaceutical:

- 1.6-2.0 mCi I-123 capsules
- 3-4 mCi I-131 capsule (Standard I-131 Whole body)
- 5-200 I-131 capsule (Therapy I-131 Whole body)
- Hot marker can either be Co-57, Tc99m or I-123 point source.

Safety

Perform procedure in compliance with Radiation Safety Procedure Manual.

Patient Preparation

<u>Non-thyrogen Procedure</u>

Patient to go on low-iodine diet 6 weeks prior to exam date.

Patient will go off all thyroid medication for 4-6 weeks prior to exam. Exact amount of time to be determined Radiologist.

Patient should not have IV iodine contrast for 6 weeks prior to exam date.

Explain procedure to patient.

Test takes multiple days: Dose patient orally with either I-123 or I-131 per doctor's order on day 1. Perform scanning the next day (24 hours) for I-123. If using I-131 scan 2 days (48 hours) post dosing. For

the I-131 therapies the scan may take place up to ten days later. Results of first scan may result in a additional scans per Radiologist recommendation. Timing can be revised by Radiologist.

The patient should be NPO 2hrs prior to taking capsules and 2 hour after taking capsules.

Patient should not be pregnant or breast-feeding. If the patient is being dosed with I-131 and there is no documentation of a tubal, hysterectomy, or under 55 years of age, obtain a pregnancy test. This will need to be done within 5 days prior to dosing.

Thyrogen Procedure

Patients to go on a low-iodine diet 2 weeks prior to exam date.

Patients can take all thyroid medications as normal.

Patients should not have IV iodine contrast for 6 weeks prior to exam date.

Order for thyrogen needs to be sent to SVH pharmacy one week prior to appointment.

Patient receives Thyrogen shots in SOU for two consecutive days.

Patient receives radioactive dose on the third day. Dose patient orally with either I-123 or I-131 per doctor's order.

The scanning day is done the fourth day for I-123 and the fifth day for I-131. For the I-131 therapies the scan may take place up to ten days later. Results of first scan may result in additional scans per Radiologist recommendation. Timing can be revised by Radiologist.

The patient should be NPO 2hrs prior to taking capsules and 2 hours after taking capsules.

Patient should not be pregnant or breast-feeding. If the patient is being dosed with I-131 and there is no documentation of a tubal, hysterectomy, or under 55 years of age then obtain a pregnancy test. Pregnancy test will need to be done within 5 days prior to dosing.

Procedure

If Thyrogen is being used, it will be started two days before radiopharmaceutical administration.

Radiopharmaceutical given orally.

1.6 - 2.0 mCi I-123 or dose determined by Radiologist for I-131.

For pediatric dose, Radiologist will calculate pediatric dose.

Patient returns between 16 and 24 hours after administration of radiopharmaceutical for I-123 or 48 hours post administration for I-131. For the I-131 therapies the scan may take place up to ten days later.

Patient needs to empty bladder before positioning on scan table.

Have patient remove any metal or thick objects such as wallets, necklaces, change, pocketknives, belts, etc., that may be obstructing the area of interest.

Position patient supine to achieve best images. Place camera head(s) as close to the area of interest as possible.

Standard imaging include: Whole Body and static images of Thyroid bed including Anterior spot, Anterior marker, LAO and RAO. Take additional views as needed. This imaging set can be revised by Radiologist.

For Whole Body scan, imaging will only need to scan from top of head to mid-thigh.

For Anterior marker image, use a point source to mark the suprasternal notch (SSN).

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under “notes” in PACS. This information will then be formally read by radiologist on shift for the day.

Documentation

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM WBC

PURPOSE

Detection and localization of infection and abscesses.

SUPPORTIVE DATA

Written, verbal or electronic order from provider. Scan performed as soon as possible from time of request.

May be done in conjunction with bone scan, if done with bone scan, draw blood for labeling before injecting MDP for bone scan.

INDICATIONS

Include but not limited to:

- Prosthesis Infection
- Osteomyelitis
- Abscesses
- Diabetic foot
- Neuropathic joint infections
- Vascular graft infections
- Fever of unknown origin (FUO)

EQUIPMENT LIST

- Gamma Camera: Large Field of View single or dual head.
- Collimator: Medium Energy, Parallel Hole
- Energy Window: 20% Window centered at 173 and 247 KEV.
- In-111 Oxine 1.0 mCi

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

None

PROCEDURE

Radiopharmaceutical: IN-111-White Blood Cells, minimum 300UCi to 1.0 mCi injected IV after labeling process.

Examination time: 15 minutes for blood draw, patient returns 3-4 hrs later for re-injection, 15minutes for re-injection of blood. Patient returns 18-26 hr post injection for 1- 1.5 hr imaging. Radiologist may revise imaging protocol.

The nuclear pharmacy will send an In-111 kit with supplies to draw patient's blood. Follow kit instructions.

Label all syringes and tube with identifying stickers provided by the nuclear pharmacy.

Start a large bore I.V. on the patient. Lidocane can be used. Leave IV in until the blood is re-injected.

Draw 50-60 mLs of blood from patient using the provided syringe and heparin.

Mix the blood and heparin gently.

Return syringe into nuclear pharmacy container sitting upright.

Have blood picked up by the nuclear pharmacy.

Get patient's phone number and inform the patient you will call them when the blood is approximately 30 minutes from arriving back from nuclear pharmacy.

Inject labeled white blood cells into patient through I.V. upon return from nuclear pharmacy.

Remove IV and have patient return 20-26 hour later for imaging.

Imaging field depends on clinical indications, check with radiologist and ordering provider's requisition.

Position patient supine on imaging table with area of interest in camera field of view.

Charges will be billed, and exam will be completed in EPIC.

Image processing will be completed, and images will then be placed on PACS along with accompanying documentation. Technologist can add additional information under "notes" in PACS. This information will then be formally read by radiologist on shift for the day.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- NM "General" worksheet
- Inpatient History & Physical- if available
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.
- Send original MD order to Medical Records.
-

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM Xofigo

PURPOSE

Xofigo is used for the treatment of patients with castration-resistant prostate cancer (CRPC) with symptomatic bone metastases and no known visceral metastatic disease.

SUPPORTIVE DATA

Written, verbal, or electronic order from referring physician.

Xofigo order form (signed by ordering doctor)

INDICATIONS

Include but not limited to:

- Patients with painful osseous metastatic disease

EQUIPMENT

- ***Radiopharmecutical:*** Ra-223 (Xofigo)
- Dosage Calculation: 1.49 uCi per pateint's weight (kg), not to exceed 183 uCi (270 lb. patient)
- Use I.V. set up with 10cc saline flush before and after radiopharmaceutical
- 3-way stopcock.
- Use injection room or camera room.

SAFETY

Perform procedure in compliance with Radiation Safety Procedure Manual.

PATIENT PREPARATION

- Consult with Radiologist before first treatment
- Bone scan within two months prior to treatment is recommended
- Labs (ANC, Platelet, hemoglobin, creatinine clearance, neutrophils and WBC) completed within 2-4 days prior to treatment recommended
- Recommend 8-16 oz of water prior to administration.
- No restrictions on food, liquids, or medications
- Give Xofigo instructions to patient
- Current weight (not more than 5 days old)
- Patient will have up to 6 treatments

PROCEDURE

Pre-Treatment

- Whole body bone scan within 2 months before treatment

- Labs (ANC, hemoglobin, platelet, creatinine clearence, neutrophils and WBC) drawn 2-4 days prior to dosing
- Consult with Nuclear Medicine Director before dosing.

Day of treatment

- Dosing must be done with radiologist supervision.
- Verify patient identification with two forms of ID.
- Explain procedure to patient. Inform patient all possible side effects.
- Consent form signed
- Fill out "TIME_OUT" sheet before injecting.
- Patient may either sit or lay down for injection
- Place I.V., lidocain may be used.
- Attach 3-way stopcock to line
- Flush IV line with 10 mL normal saline before dosing.
- Measure Ra-223 doses in dose calibrator at proper settings. Document value.
- Under Radiologist direction, technologist to inject Ra-223 dose slowly over one min.
- Flush with 10-15 mL saline.
- Measure residual dose in syringe in dose calibrator. Document value.
- Dispose of residual radioactivity in long half-life waste bin.
- Provide patient with "Travel Document"
- Remind patient they will be notified of next follow-up labs by Oncology.
- Remove IV and decay in appropriate bin

Side effects/reactions

May have nausea, diarrhea, vomiting, swelling of arms or legs, bleeding, and/or infection.

May have erythema, pain and edema at injection site

Instruct patient to tell his/her Oncologist if there are any side effects.

Post treatment

Patient will be set up for next appointment a month later. Labs will be drawn, and a current weight obtained. Oncologist will determine if next dosing should occur.

Oncology will inform Nuclear Medicine if treatment may be delayed or canceled.

Encourage patient to stay hydrated, and to notify Oncologist if any decrease in urine output.

Practice good hygiene throughout full treatment (6 months) and for at least 1 more week after final Ra-223 injection.

Sexually active patients should use condoms throughout therapy treatment (6 months) and an additional 6 months after final dose of Ra-223.

Billing and ordering exam notes

Authorization for treatment will be good for six (6) doses in a one-year period of time. This allows for changes in patient status.

Each of the six doses of Ra-223 will be billed separately. Patient will need to register for each dosing.

Send email to Medicare Group Billers stating "Add (number of) microcuries to BOX 80 of UB claim form, for patient: Name, K #, Date of Birth, & Date of Service"

Charges will be billed and exam will be completed in EPIC.

Technologist can add additional information under “notes” in PACS. This information will then be formally read by supervising radiologist on shift for the day.

DOCUMENTATION

- Written, verbal, or electronic order from provider.
- Xofigo order sheet
- NM Xofigo worksheet
- Consent forms
- Labs and History & Physical
- Affix radiopharmaceuticals sticker to worksheet with correct dosage listed.
- Scan all documents into PACS
- Bill patient in EPIC.

Approved by Medical Director, Dr. Muneer Desai, on 02/14/2022

NM-Instructions for patients receiving I-131 Therapy

PATIENT
NAME:_____Date:_____
__

MR#_____ Dosed with _____mCI of I-131 on: ____/_____/_____

Patient and Family Learning Needs

The patient:

Does not have special learning considerations

Has special learning considerations which will change the method of instruction (specify if present).

Patient and Family Instructions

Safe and effective use of medications.

Resume previous thyroid medications as directed by your referring physician.

Please observe the following precautions for seven (7) days, unless otherwise specified.

Diet and Nutrition

Do not eat for 2 hours following the administration of I-131 capsule(s), however you may drink clear liquids (water, coffee, tea, fruit juice, and/or soft drinks)

Drink as much fluid as tolerable for 48 hours following administration.

Suck on hard or sour candy frequently for 48 hours to encourage the flow of saliva.

Use disposable cups, plates, and other dishes and utensils.

Suggestions to minimize the radiation dose to other people

Avoid sustained close contact with other people, especially infants, children, and pregnant women. Remember that radioactive contamination may spread to others through your perspiration, saliva,urine, and feces.

Sleep alone in a separate room from others.

Avoid conception for 6 months.

Do not travel by airplane, mass transportation, or for prolonged automobile trip with others.

Personal hygiene and grooming

Urinate frequently (every two hours if possible). Men need to sit down to urinate during this time.

Flush the toilet twice after each use and keep your hands clean.

Shower daily and use clean towels for two (2) days.

Wear clothing that can be machine washed (not dry-cleaned).

Wash your clothing, towels, and bedding separately (put through wash/rinse cycles twice)

In the rare chance you should vomit within two(2) hours of receiving the therapy dose, use biodegradable paper towels to soak up the material and flush it down the toilet. Try not to spread the material around, as it will be radioactive. Wash your hands. Inform the nuclear medicine staff as soon as possible at 360-428-2256.

Special instructions

If you experience any of the following symptoms, contact your physician:

Increased shakiness, rapid heart rate, shortness of breath, difficulty breathing or increased pain or swelling in the neck over the next 2-3 weeks

_____
___

Important Telephone Numbers

After hours urgent calls can be made to the Skagit Valley Hospital Operator at 360-424-4111 and ask to be connected to the Emergency Department at ext. 2166.

During normal business hours (M-F, 8:30am-5pm) call Nuclear Medicine at 360-428-2256.

If you have an Emergency, call 911.

_____
___

Additional instructions:

Check with your referring physician for follow-up appointments.

_____
_____

_____
_____

I have reviewed the release instructions with the patient and/or family or caregiver. The patient or caregiver was able to verbalize understanding of the instructions. A copy of these written instructions was given to the patient or caregiver.

____ M.D.   _________________________________

Signature   Date

^^

Release instructions have been explained to me and/or my family or caregiver. I have received a copy of the instructions and I understand them.

Signature:____
Date:_____________________________

Circle one: Patient   Family member   Caregiver

^^

Send original to Medical Records and scan into PACS; and give patient and/or family one copy.

References

Reference Type Title   Notes

Current Effective Date   11/24/2021   Next Review Date